UNITED STATES PATENT OFFICE.

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MANUFACTURE OF SHEETS, PLATES, &c.

1,010,510. Specification of Letters Patent. Patented Dec. 5, 1911.

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To all whom it may concern:

Be it known that we, CHARLES J. MESTA and SAMUEL E. DIESCHER, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, citizens of the United States, have invented or discovered certain new and useful Improvements in Manufacture of Sheets, Plates, &c., of which improvements the following is a specification.

It is the present practice in the manufacture of sheets and plates for tinning, galvanizing, etc., to subject the sheets or plates after being broken down or rolled to gage, to acid to remove scale, etc., and then to a bath for neutralizing the acid and cleansing the sheets, these steps in the method being generally known as "black pickling." The sheets or plates are then packed in a box and subjected to an annealing heat, this step requiring in raising the sheets or plates to an annealing temperature *i. e.* about a dull red, and in cooling, about twenty four hours or more. After annealing the sheets are cold-rolled to impart a smooth finished surface. As is well known the cold-rolling has a hardening effect on the material which is removed by again annealing the sheets or plates. After this second annealing the sheets or plates if they are to be cooled are passed through weak acid and neutralizing baths preparatory to the final or coating operation.

As is well known to the skilled metallurgists, frequent annealing has a decidedly detrimental effect on steel and it is the object of the invention described herein to so treat the sheets or plates after they have been broken down and rolled to gage, as to avoid raising them more than once to a temperature at which a molecular change will occur. By a course of careful experiments it has been ascertained by us that any annealing between the black pickling and cold rolling steps will when taken in connection with the subsequent steps of the present method, have an injurious effect on the sheets or plates. It is not to be understood that this annealing in and of itself injures the sheets but that the combined effects of this annealing and the annealing necessary to soften the sheets after cold-rolling are detrimental to the sheets or plates.

We have ascertained that better and softer plates or sheets are produced by black pickling thoroughly drying, cold rolling and annealing than when treated in the old way. It will be understood that when sheets are to be coated they should be white pickled after the annealing.

On account of the thinness of the sheets during the last stages of reduction in the hot mill it is exceedingly difficult to keep the pack sufficiently hot to prevent some cold rolling effects, which are not uniformly distributed through the sheets or plates, and the annealing subsequent to black pickling in the present method is for the purpose of bringing the sheets or plates to a uniform condition in order to facilitate the cold-rolling. It is believed that the improved condition of the finished plates or sheets and other benefits incident to our method will far outweigh any difficulties experienced in cold-rolling the unannealed sheets.

In carrying out our method the sheets or plates are merely dried after the black pickling and if any heat is employed in such drying operation, it is far below the temperature at which any molecular change, similar to that effected in annealing can occur. After the sheets or plates have been dried they are cold-rolled and annealed and if they are to be coated they are again pickled and tinned or otherwise coated as in the present method.

In the practice of our improved method we are able not only to produce better sheets or plates but greatly to reduce the cost of the plant and of production. The present method requires the use of an annealing furnace, trucks, tracks, cranes and pots. The original cost of all these is large. In operating the annealing furnace a large amount of fuel is necessary and a large number of laborers must be employed in charging and discharging the furnaces. One of the largest items in the cost of operation is the renewals of the annealing pots which are large and expensive. In addition, a large amount of unfinished stock must be stored in the mill, for the reason that it requires at least twenty-four hours to anneal and cool one charge of the furnace. This unfinished stock is idle capital.

While the practice of the invention described herein is not limited to the use of any particular form of construction of apparatus for drying the sheets it is preferred to use one in which the water and moisture are removed by the combined operation of a movement of the sheets and plates and the evaporative effect of a rapid flow of air or

other suitable gas over the surfaces, such air or gas being by preference heated to or somewhat above the vaporizing temperature of the liquid to be removed but not to a temperature which will produce any molecular change in the sheets or plates.

We claim herein as our invention.

The method of manufacturing sheets or plates, which consists in hot rolling the sheets or plates, black pickling them, drying them at a temperature at which no annealing effect will occur, cold-rolling the sheets and annealing them.

In testimony whereof, we have hereunto set our hands.

CHARLES J. MESTA.
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Witnesses:
G. G. TRILL,
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